SIGNIFICANCE OF SERUM PHOSPHOHEXOSE ISOMERASE, HEXOKINASE AND ALDOLASE IN CARCINOMA OVARY

YESHOWARDHANA* AND V. S. SINGH

Department of Biochemistry, L.L.R.M. Medical College, Meerut - 250 110

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Summary: The Serum phosphohexose isomerase (PHI), aldolase and hexokinase activities have been determined in 36 patients of carcinoma ovary with different clinical stages and in 25 healthy normal female subjects. The serum PHI and hexokinase levels were significantly elevated (P<.001) in all the stages of malignancy while serum aldolase was significantly elevated only in stages III and IV of malignancy. The enzyme levels showed statistically significant response to therapy in stage II patients. The mean values in patients with progression of the disease were not significantly different.

Key words: serum enzymes phosphohexose isomerase

hexokinase

aldolase

carcinoma ovary

INTRODUCTION

The main metabolic feature which distinguishes most matignant tumor tissue from normal tissue is the high glycolytic capacity (6). After the knowledge of this fact, numerous attempts have been made to use blood enzymes estimation in diagnosis and in following the course of therapy. Increased lactate dehydrogenase activity has been reoprted in carcinoma ovary (1, 4).

The increased aldolase (ALD) and hexokinase (HK) activity has been studied in breast carcinoma (8). The present study is an effort to find out whether serum PHI and ALD and HK may also be used as biochemical parameters for diagnostic purposes and to evaluate their utility in following the course of therapy.

MATERIAL AND METHODS

Thirty six cases of carcinoma ovary and twenty five healthy normals were taken for

^{*} Present address: Lecturer in Chemistry, C.L. Jain Postgraduate College, Firozabad (U.P.)

this study. Among 36 cases 9 belonged to Stage II, 16 stage III and 11 stage IV. No patient of stage I has been found.

The serum PHI estimation was done according to Bodansky (2), by the method described in Sigma Technical Bulletin No. 650. The serum aldolase activity was determined by the method of Sibley and Lehninger (3) and Wolff et al. (7) described on the Sigma Bulletin No. 752. The serum hexokinase estimation was done by the method of Sols and Krane (5).

RESULTS

Serum phosphohexose isomerase (PHI), aldolase (ALD) and hexokinase (HK) levels were determined in 25 normal healthy female subjects and 36 cases of carcinoma ovary. These cases were divided into the stages as described earlier using the criterion of International Federation of Obstetrics and Gynaecology.

Table I, illustrates the serum phosphohexose isomerase activity levels in controls and carcinoma ovary. Table II shows the serum aldolase activity levels in controls and carcinoma ovary and Table III shows the serum hexokinase activity levels in controls and carcinoma ovary. The activity of serum PHI, ALD and HK are expressed in Bodansky Units, Sigma Units/ml and unit/mg protein, respectively.

TABLE 1: Serum PHI levels in carcinoma ovary before and after treatment.

Group	No. of cases	Range (Mean ± SD) (B.U.)	No. of cases	After treatment Range (Mean ± SD)
Control	25	9-41 25.87 ± 9.87		- 1
Carcinoma ovary				
Stage II	9	30-75 54.25±6.73***	7	15-40 27.13±7.12
Stage III	16	63-107 80.61 ± 14.32***	13	27-94 76.44 ± 13.2
Stage IV	-11	89-157 124.00±27.65***	8	98-184 130.25±28.7

TABLE II: Serum ALD levels in carcinoma ovary before and after treatment.

Group	No. of cases	Range (Meam±SD) Su/mi	No. of cases	After treatment Range (Mean±SD)
	6.44 ± 2.05			
Carcinoma ovary				
Stage II	9	3.4-15.5	7	3.1-9.1
		7.04±1.83		6.94 ± 2.25
Stage III	16	4.9-3-0.4	13	4.6-28.2
		16.7 ± 2.83***		17.32±2.53
Stage IV	11	4.6-28.6	8	6.8-31.9
		18.01 + 3.57***		20.25 ± 3.6

***P<.001

TABLE III: Serum HK levels in carcinoma ovary before and after treatment.

Group	No. of cases	Before treatment Range (Mean ± S.D.) (Unit/mgP)	No. of cases	Range (Mean ± S.D.)
Control Carcinoma ovary	25	5.2-13.2 9.43 ± 2.24	_	-
Stage II	9	7.8-20.4 15.37 ± 5.14***	7	7.2-12.4 9.15±1.86
Stage III	16	8.5-27.2 18.62 ± 6.21***	13	8.6-26.1 17.55 <u>+</u> 6.83
Stage IV	11	10.1-30.6 21.34±8.93***	8	9.4-26.6 20.63±8.25

***P<.001

DISCUSSION

Serum PHI: Serum PHI activity was diagnostic in 7 out of 9 cases in stage II and in all the cases in stage III and IV. Comparatively lower values of this enzyme were observed in stage II and the highest in stage IV.

The elevated level of serum PHI came to normal limits after six months treatment in all the cases of stage II. In stage III, only one patient, showed normal values, while rest of the cases showed significantly elevated levels of the enzyme. In stage IV patients the levels remained significantly elevated due to the worsening conditions of the patients. These results could not be correlated due to absence of similar data.

Serum ALD: Serum ALD activity was diagnostic in 4 out of 9 cases in stage-II, 11 out of 16 caxes in stage III and 9 out of 11 cases in stage IV. No correlation of enzyme activity and clinical stage had been observed. These results could not be correlated due to the absence of similar data.

All the stage II patients showed normal levels of this enzyme after effective treatment. In stage III, enzyme levels remained elevated, except in few cases. While stage IV patients, due to worsening condition showed significantly high enzyme levels.

Serum HK: Serum HK activity was diagnostic in 7 out of 9 cases in stage II, 12 out of 16 cases in stage III and 9 out of 11 cases in stage IV.

The elevated level of this enzyme came to normal after six months treatment in all the cases of stage II. In stage III, enzyme levels remained high throughout the study except in four cases. In stage IV, the enzyme level remained elevated throughout study with slight variations. These observations also could not be correlated due to the absence of similar data.

Thus the level of PHI in serum in carcinoma ovary may be monitored with treatment and so it could be used as an adjunct to histopathological diagnosis. All the three enzymes studied correlated well with the clinical stage of the disease.

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